

THE OESOPHAGUS

ANATOMY :

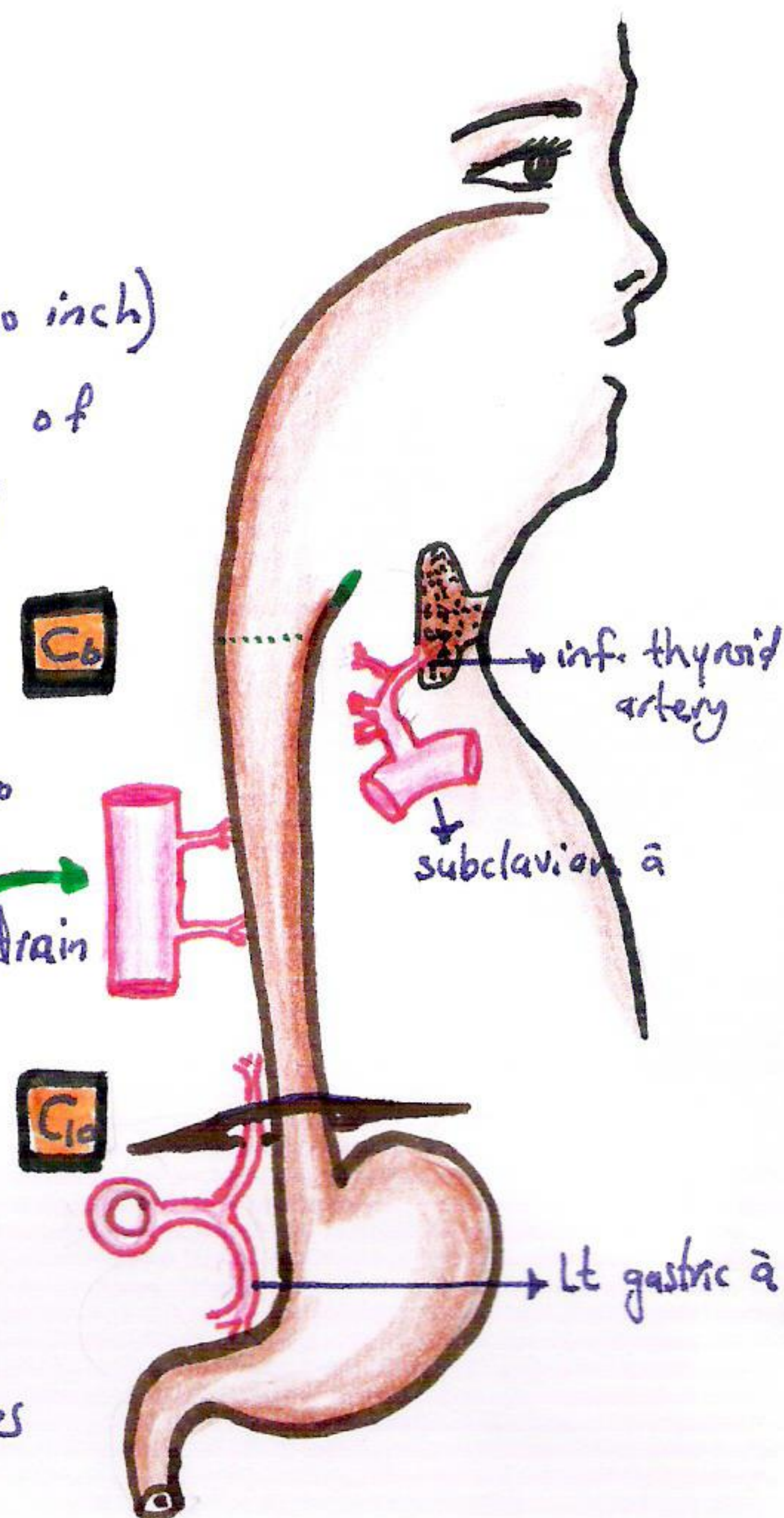
* Description :

- The oesophagus is a muscular tube, 25 cm (10 inch)
- Starts opposite C6 vertebra as a continuation of pharynx & ends opposite T10 at oesophageal opening of diaphragm.

* Blood supply :

- ① Cervical part: → inferior thyroid a & drains to inferior thyroid vein
- ② Thoracic part: → descending thoracic aorta, drain to azygos vein.
- ③ Abdominal part: → Lt gastric a & drains to Lt gastric vein → (Portal vein)

NB: the lower end of esophagus is a site for porto systemic anastomosis, if enlarged → varices



* Lymph drainage :

- ① Cervical part: → into lower deep cervical LN.
- ② Thoracic part: → into Broncho mediastinal LN.
- ③ Abdominal part: → into Lt gastric & Coeliac LN.

HISTOLOGY

Oesophagus is formed of 3 layers

- ① Mucosa: - stratified sq. epith.
- ② Submucosa: - containing vessels & lymphatics.
- ③ Muscularis: - striated ms (in upper 2/3) & smooth ms (in lower 2/3)
- ④ Serosa (in lower abdominal part) or adventitia in upper & middle parts

VISIT...

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DYSPHAGIA

* **Definition:** Difficult swallowing [NB. Odynophagia = Painful swallowing]
usually vague expression by pt

* **Causes:-** (I) **Local causes:**

(a) Inside lumen:- foreign bodies.

(b) Outside lumen:- Malignant pressure (thyroid, bronchial ca).

- Retrosternal goitre.
- Aortic aneurysm.
- Malignant LN.
- Rolling hiatus hernia.
- Dysphagia Lusoria: (vascular ring): is a congenital abnormal vessels as double aorta.

(c) In the Wall:-

- Congenital → esoph. atresia.

- Traumatic → Corrosive stricture & injury.
- Neoplastic → Carcinoma.
- Inflammatory → Reflux esophagitis.
- Neuromuscular → Achalasia.
- Plummer-Vinson syndrome (esoph. web).

(II) **General causes:** [other than esoph.]

(a) In mouth:-

- Stomatitis, Glossitis, Ca. tongue, cheek, ...

(b) In pharynx:-

- pharyngitis, pharyngeal diverticulum
- Retropharyngeal abscess.
- Tonsillitis, Paratonsillar abscess.

(c) Functional causes

- Myasthenia gravis. or tetanus.
- Bulbar palsy & bulbar poliomyelitis.
- Diffuse spasm (corkscrew) "achalasia"

PLUMMER-VINSON SYNDROME:

- It is a dysphagia + iron deficiency anemia
 - C/P: - pt usually middle aged or elderly female.
 - present $\bar{e}$ dysphagia + iron deficiency (koilonychia; spoon-shaped nails & smooth tongue). *Splenomegaly*
 - Pathology: - dysphagia is associated $\bar{e}$ hyperkeratinization of esoph. & formation of web (esoph. web) in upper part of esophagus (post cricoid web).
 - Complication: - it is a precancerous (ca. of cricopharyngeal region).
 - ttt: - treat iron^{anemia} improve dysphagea, may require dilatation of web & follow up to check carcinoma.
- [NB: - it is first described by Paterson & Kelly before Plummer & Vinson. some write full 4 names]

PHARYNGEAL POUCH: "esoph. diverticulum" (Zenker's diverticulum)

- Definition: - a mucosal protrusion between the two parts of inferior constrictor ms (thyropharyngeus & cricopharyngeus)
- Aetiology: there's weak area in that site posteriorly called "Killian's dehiscence" the pouch originate above the spasm in cricopharyngeus.
- Pathology: - the diverticulum develops first posterodly but expands laterally (usually lt side).
- C/P: - more in men. σ - elderly, presented by dysphagia regurgitation from pouch with possible palpable swelling in the neck which gurgles $\rightarrow$ foetor.
- Complication: - aspiration pneumonia, Lung abscess.
- Treatment: Excision of pouch combined $\bar{e}$ post myotomy (cricophary.)

Dx: Barium swallow, CT scan

other complications: - perforation, diverticulitis, (carcinoma 0.3%)
due to chronic irritation

I-CONGENITA OESOPH. ATRESIA

*Incidence : 1:4000

*Types : It may be :

① Atresia with fistula (88%) either

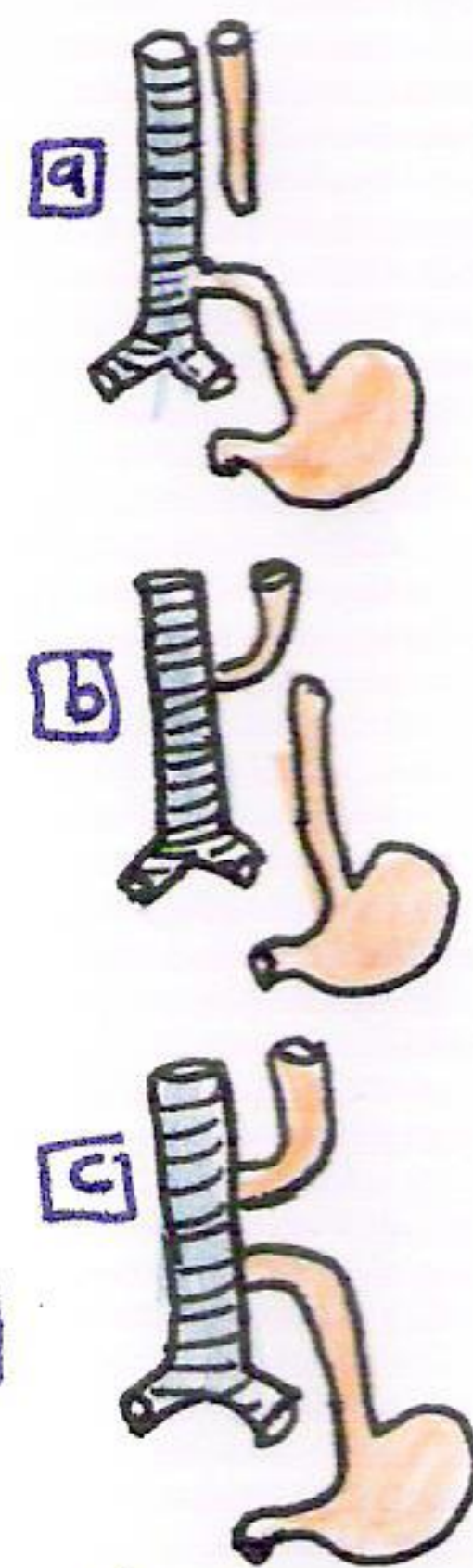
Ⓐ Proximal atresia & distal tracheoesoph. fistula. (85%)

Ⓑ Distal " " Proximal " " " (2%)

Ⓒ Both at same time (1%)

② Atresia without fistula (12%):

-ie blinding Proximal & distal ends of esophagus.



*Clinical Picture:

- [It must be suspected in any newborn & frothy saliva]

• Antenatal Diagnosis → Mother & polyhydramnios.

• At birth: → frothy saliva, milk regurgitation, cyanotic attacks.

• chest & pneumonia & Abdomen → Distended if atresia with fistula & scaphoid if atresia & out fistula.

*Associated congenital anomalies :-

- VACTERL syndrome (2 of them at least present).

• Vertebral → Spina bifida.

• Anorectal → imperforated anus.

• Cardiac → Fallot, ASD, VSD.

• Trachea → Tracheoesoph. fistula.

• Renal → Polycystic kidney.

• Limb → anomalies at radial side of limb.

*Investigations:

① X-ray: after injecting Lipidol (NOT BARIUM).

② Fibroptic paediatric oesophagoscopy.

③ in examination → arrested NGT tube after about 10 cm from nose.

*Treatment:

- if & fistula → Ligate fistula & 1st esoph. anastomosis [by ^{Rt} 5th intercostal incision]

- if & out fistula → ie usually long gap so do gastrostomy first then months later restore esophageal continuity.

irritation of trachea & lung
obstruction

II. OESOPH. INJURY

- * Causes :**
- ① Instrumental iatrogenic → Commonest 1:4000 oesophagoscopy or at dilatation
 - ② Traumatic → foreign body, penetrating injury & Corrosives swallowing
 - ③ Emetogenic → e.g. in Mallory Weiss syndrome (due to forcible repeated vomiting).

*** Investigation:** X-ray chest (air in mediastinum) & esophagogram (Lipidol) ↗ not barium

*** Treatment:** Gastrotomy done after repair of tear (by thoracotomy).

Corrosive injury : [usually involve mid & lower esophagus]

*** Pathology:** degree of chemical burn depends on ① concentration & ② type of chemical & ③ duration of contact w tissue.

- Alkali → Liquifactive necrosis of all layers.
- Acids → Coagulative necrosis of superficial layer.
- finally the tissue becomes fibrosed → stricture.

*** Clinical picture:** fever ± shock, inflamm. & oedema of lips, tongue [& may found complete esoph. obstruction by oedema]

*** Complication:**

① shock	② Dehydration	③ Chest infection
④ Perforation → Mediastinitis		⑤ Malignancy.

*** Management:** (Emergency case):

- first aid ttt (ABC); neutralize acid (vinegar) or alkali (Na-bicarb) OR
- Wash corrosive by water, or eggs or white starch
(some say → chemical antidote may → gas production → esoph. rupture)
- Medical ttt → Antibiotic, steroids (for 6 wk → ↓ fibrosis) & analgesia.
- then investigation → Oesophagoscopy (after 24 hr) or barium swallow
- then local ttt → after acute stage (> 3 wk) start esoph. dilatation by Bougie "guided by esophagoscopy"
- Surgery → if failure of dilatation do
 - Oesophagectomy → if short segment or
 - Colon by-pass → if long segment.
 - ↙ or small intestine

*** NB** never induce vomiting → rupture of damaged esophagus

CREST syndrome =
 Calcinosis
 Raynaud syndrome
 Esoph. desmotility (achalasia)
 Sclerodactyl ——— localised thick tight skin of digits
 Telangiectasia

III - ACHALASIA

* Definition:

- It is a neuromuscular failure of relaxation at the lower end of oesophagus $\bar{e}$ progressive dilatation, tortuosity, incoordination of peristalsis & often hypertrophy of oesophagus above.

* Incidence:

- Common in third decade (20-40), $\text{♀}:\text{♂} = 3:2$.

* Aetiology:

- Unknown: but may be degeneration of intermuscular ganglion cells of esophagus [Auerbach's plexus]
- It is indistinguishable from Chaga's disease where trypanosome *cruxi* destroys Auerbach's plexus. MCQ

* Clinical picture:

- ① Dysphagia: $\rightarrow$ progressive (over months to years) - More to fluid than solid
- ② Regurgitation: $\rightarrow$ mainly nocturnal, foul smelling fluid.
- ③ Retrosternal discomfort $\rightarrow$ from retention & dilated esophagus.
- ④ C/P of complication $\rightarrow$
 - Aspiration pneumonia
 - Oesophagitis & ulceration (Barrett's ulcer).
 - Malignant transformation (by chr. irritation) (5%)

* Investigation:

Rat tail appearance, Sigmoid esophagus, & hypersensitivity peristalsis to Ach.

- ① X-ray $\rightarrow$ wide mediastinum $\bar{e}$ air-fluid level, pneumonitis. Lack of gas bubble in stomach $\uparrow$
- ② Barium swallow $\rightarrow$ (Bird's beak): dilated esoph. $\bar{e}$ narrow lower part.
- ③ Oesophagoscopy $\rightarrow$ dilated esoph. filled $\bar{e}$ stagnant food & fluid

* Treatment:

- ① Dilatation by Plummer hydrostatic bag: ie forcible dilatation $\bar{w}$ improve symptoms in 80% of cases, but risk of rupture 5%.
- ② Surgery: Heller's cardiomy: cardiomy of muscle up to mucosa in lower esoph. & upper stomach, now done thoracoscopically
 - it resembles Ramsted's operation of C.H. pyloric stenosis.

V - REFLUX OESOPHAGITIS

* **Definition:** It is a gastro-esophageal reflux disease:

* **Causes:** - Caused by incompetent cardiac sphinctor as due to hiatus hernia (sliding type) ^{Prolonged NGT} (Barrett's ulcer)

* **Pathology:** Reflux of peptic juice → ulceration[↑] & inflammation & eventually to stricture formation

NB: factors preventing Reflux are:

- ① anatomical sphincter (at cardia opening).
- ② physiological sphincter by Rt crus of diaphragm.
- ③ pressure at abdominal part of esoph. by ↑↑ intraabd. pressure
- ④ Rosette-like of cardiac gastric mucosa ^{ES}
- ⑤ valve-like effect of oblique esophagogastric angle

NB:- 2nd reflux esophagitis may be caused by

- ① repeated vomiting esp. $\bar{e}$ duodenal ulcer (high acid)
- ② Long standing nasogastric intubation.
- ③ resection of cardia.
- ④ ectopic acid-secreting gastric mucosa (Barrett's esophagus)

* **Investigation:**

- Fibro-optic oesophagoscopy → can Diagnose esophagitis & take biopsy
- 24 hr esoph. PH → most diagnostic, shows $\text{PH} < 4$ (acidic)
- Acid-infusion test → infusion of small dilute hydrochloric acid (0.1 ml/L) will trigger pain & resolved when infusion switched to saline
- Barium-swallow → Diagnose hiatus hernia, stricture

Grading of reflux by endoscopy:

Grad I → hyperaemia II - Erosions III - ulcers IV - stricture & Barrett's ulcer

* **Clinical picture:** (pt usually > 40 yr & fatty female)

- Retrosternal burning pain ^{as angina} ↑ by lying flat & ↓ by standing upright.
- Regurgitation of water brach, acidic & bitter fluid
- Dysphagia: due to spasm at 1st, Later by fibrous stricture.
- Complications as aspiration pneumonia, Barrett's ulcer (precancerous) & bleeding (ch. anemia) and esoph. strictures.

* Treatment of reflux esoph.:

①- conservative & medical ttt:-

- Reduce body wt, avoid smoking, cafe, avoid sleeping flat.
- Drugs:- Antacids + omeprazole (proton pump inhibitor) or Ranitidine (H₂-blockers) → ↓ acidity.

②- surgical ttt: - Nissen 360 Belsey 270

- indicated if failed medical ttt or complication as stricture...
- Antireflux procedure as Nissen's fundoplication in which the fundus of stomach is sutured around the lower esoph. in an inkwell fashion in order to produce an antireflux valve (it done at laparotomy or laparoscopic).

③- In case of stricture give medical ttt + frequent dilatation.

VI - HIATUS HERNIA

- It can be sliding (90%) or rolling "paraesoph." (10%).

(A) Sliding hiatus hernia:

* definition: herniation of cardioesoph. sphincter with part of stomach through esoph. hiatus.

Is a cause of congenital short esophagus.



* pathology

* C/P

* investigation

* Treatment

} see reflux esophagitis.

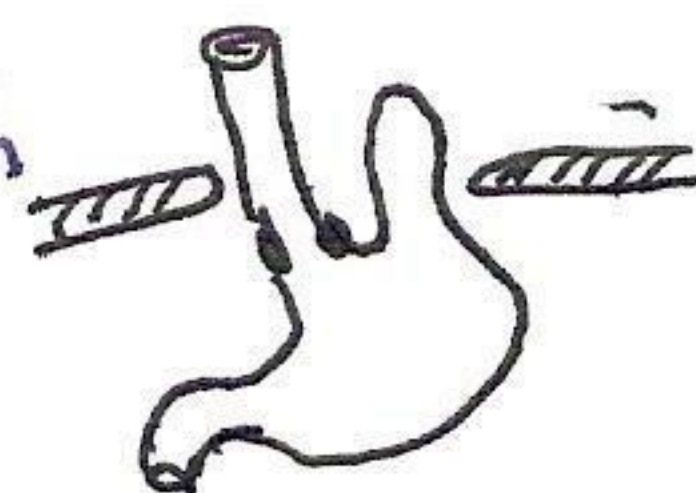
(B) Rolling "paraesoph." hernia:

* definition: herniation of greater curvature of stomach without sphincter (ie no reflux)

* C/P → a symptomatic, but if huge → chest pain, hiccough (irritation of phrenic N.), dysphagia, dyspnoea

* investigation: → barium meal, chest X-ray (gas shadow in chest).

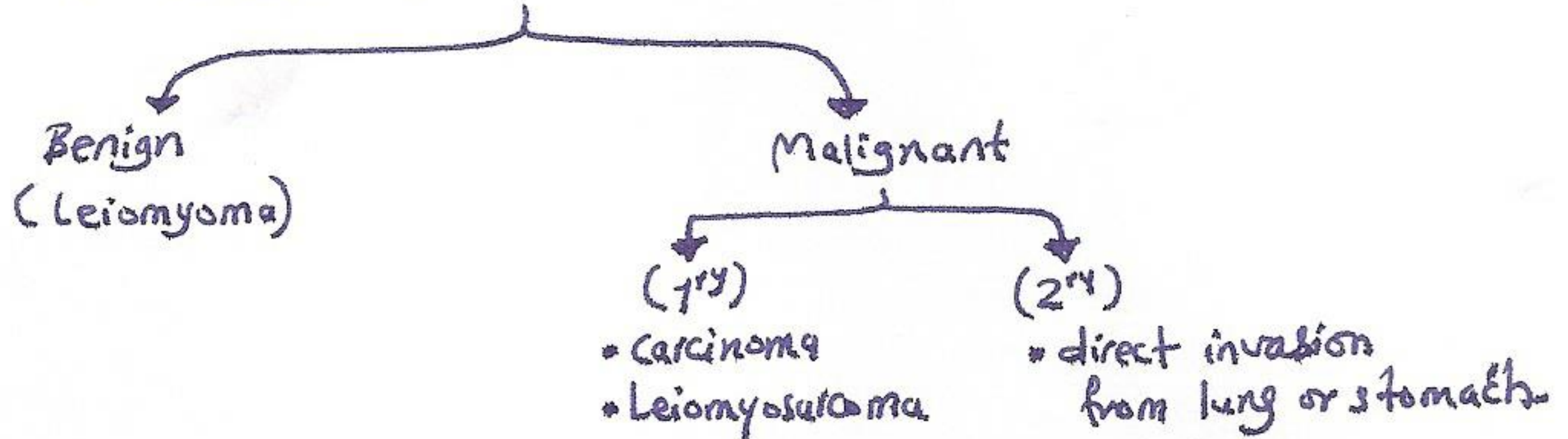
* Treatment: → Excise hernial sac & close hernial defect.



VII

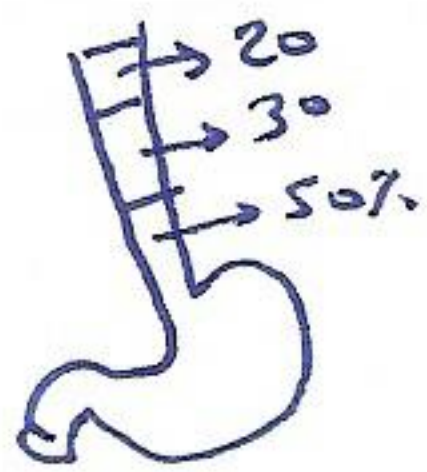
CARCINOMA OF OESOPH.

NB: the esoph. tumours classified into



* **Incidence of ca.:** in elderly >50yr, ♂:♀ 3:1. common in china. UK.

* **predisposing factor:** - ① chronic irritation (Spirits, Spices, Smoking, Sepsis & \$)



- ② Plummer-vinson syndrome.
- ③ Barret's ulcer & reflux esophagitis.
- ④ Achalasia.
- ⑤ Corrosive stricture

* **Pathology:** - commonest at middle 1/3 (50%), then lower (33%) & upper (17%).

N/E - It may be of annular, ulcerative or fungating type.

Micro - squamous cell ca. (95%) or adenoca. (5%) as from Barret's ulcer

* **Spread:** Can be local to adjacent structure.

- lymphatics & blood (Liver, Lung, Bone & rarely brain).
- Transcoelomic spread in abdominal part (Krukenberg).

* **Staging:** TNM staging.

Tis = Ca in situ

T1 = confined to mucosa.

T2 = to musculosa.

T3 = extraesoph. spread

No = no LNs

N1 = mobile unilat LN.

N2 = mobile bilat LN.

N3 = Fixed LNs

Mo = no metastasis

M1 = Distant "

* **Clinical picture:**

① Dysphagia: insidious, slowly progressive, short duration More to solid than fluid later for both.

② Regurgitation which can → aspiration pneumonia.

③ Pain as late manifestation.

④ C/P of metastasis (LLBB)

⑤ Cachexia, wt loss & s/s of local invasion to surrounding.

NB: Dysphagia in elderly male with short history is almost invariably due to Carcinoma of esoph.

(achalasia gradual, intermittent of long duration → fluid)

* Investigation for esoph. Ca.:

- ① Barium swallow :- shows filling defect or Rat tail appearance + shouldering with mild proximal dilatation (in achalasia) ^{huge dilat}
- ② Oesophagoscopy & biopsy :- may accompanied by endoluminal u/s for evaluation of local invasion.
- ③ Metastatic work up → CT scan thorax, abdomen, u/s, bone scan, ...

* Treatment:

- It either to cure the cancer where possible & palliate dysphagia
- ① Operable cases:- resection is done & defect is usually bridged by mobilizing the stomach up into the chest & anastomose with residual esoph. or to pharynx.
- ② Palliation to inoperable cases:- done by:
 - a- Intubation with stent to relieve dysphagia.
 - b- Endoscopic laser: to vaporize the growth & restore lumen.
 - c- Radiotherapy: useful for squamous tumours
 - d- Chemotherapy: "platinum based regimen" & may accompanied by radiotherapy
 - e- Gastrostomy: in late cases as pt unable to swallow his saliva.

* Prognosis: - overall prognosis is $< 10\%$ survival at 3 years.
- the average expectation of life is 3 months - 1 year.

Diffuse esoph. spasm (DES) "Corkscrew esoph."

- in this condition the normal peristaltic waves are replaced by simultaneous repetitive & occasionally prolonged ↑ in pressure in response to deglutition.
- s/s → retrosternal pain (rather than dysphagia), corkscrew esoph (on barium swallow)
- ttt → long myotomy from the aortic arch to cardia.

Cancer esophagus

Epidemiology

- M:F = 3:1
- onset 50-60 yr of age
- upper (20-33%), middle (33%), lower (33-50%)
- main types:
 - most common worldwide: squamous cell carcinoma (SCC) in upper 2/3 of esophagus
 - most common in western countries: adenocarcinoma in distal 1/3 of esophagus

Risk Factors

- geographic variation in incidence
- SCC:
 - underlying esophageal disease such as strictures, diverticula, achalasia
 - more common in patients from Asia
- adenocarcinoma:
 - Barrett's esophagus (most important), smoking, obesity (increased reflux), GERD

Clinical Features

- frequently asymptomatic; late presentation
- progressive dysphagia (mechanical): first solids then liquids
- odynophagia then constant pain
- constitutional symptoms
- regurgitation and aspiration (aspiration pneumonia)
- hematemesis, anemia
- tracheoesophageal or bronchoesophageal fistula
- direct, hematogenous or lymphatic spread:
 - trachea (coughing), recurrent laryngeal nerves (hoarseness, vocal paralysis), aortic, liver, lung, bone, celiac and mediastinal nodes

Investigations

- barium swallow: shows narrowing – suggestive but not diagnostic
- esophagoscopy: biopsy and assess resectability
- endoscopic ultrasound (EUS):
 - visualize local disease
 - regional nodal involvement (most accurate way to stage the cancer)
- bronchoscopy ± thoracoscopy:
 - rule out airway invasion in tumours of the upper and mid esophagus
- CT chest/abdomen
- full metastatic workup (CXR, bone scan, CT-head/CAP, LTFs, etc.)

Treatment

- if present with distant metastatic disease
 - treat with systemic therapy and treat symptoms (esophageal stent)
- if locally advanced (locally invasive disease or nodal disease on CT or EUS):
 - multimodal therapy:
 - concurrent external beam radiation and chemotherapy (cisplatin and 5-FU)
 - possibility of curative esophagectomy after chemoradiation if disease responds well
 - if unable to tolerate multimodal therapy or if highly advanced disease, consider palliative resection, brachytherapy, or endoscopic dilatation/stenting/laser ablation for palliation
- if early stage (non-transmural and without evidence of nodal disease):
 - esophagectomy (transthoracic or trans-hiatal approach) and lymphadenectomy
 - anastomosis in chest or neck
 - stomach most often used for reconstruction; may also use colon
 - neoadjuvant chemotherapy and radiation are controversial
 - adjuvant chemotherapy ± radiation usually recommended for post-op node-positive disease

Prognosis

- prognosis usually poor because presentation is usually at advanced stage

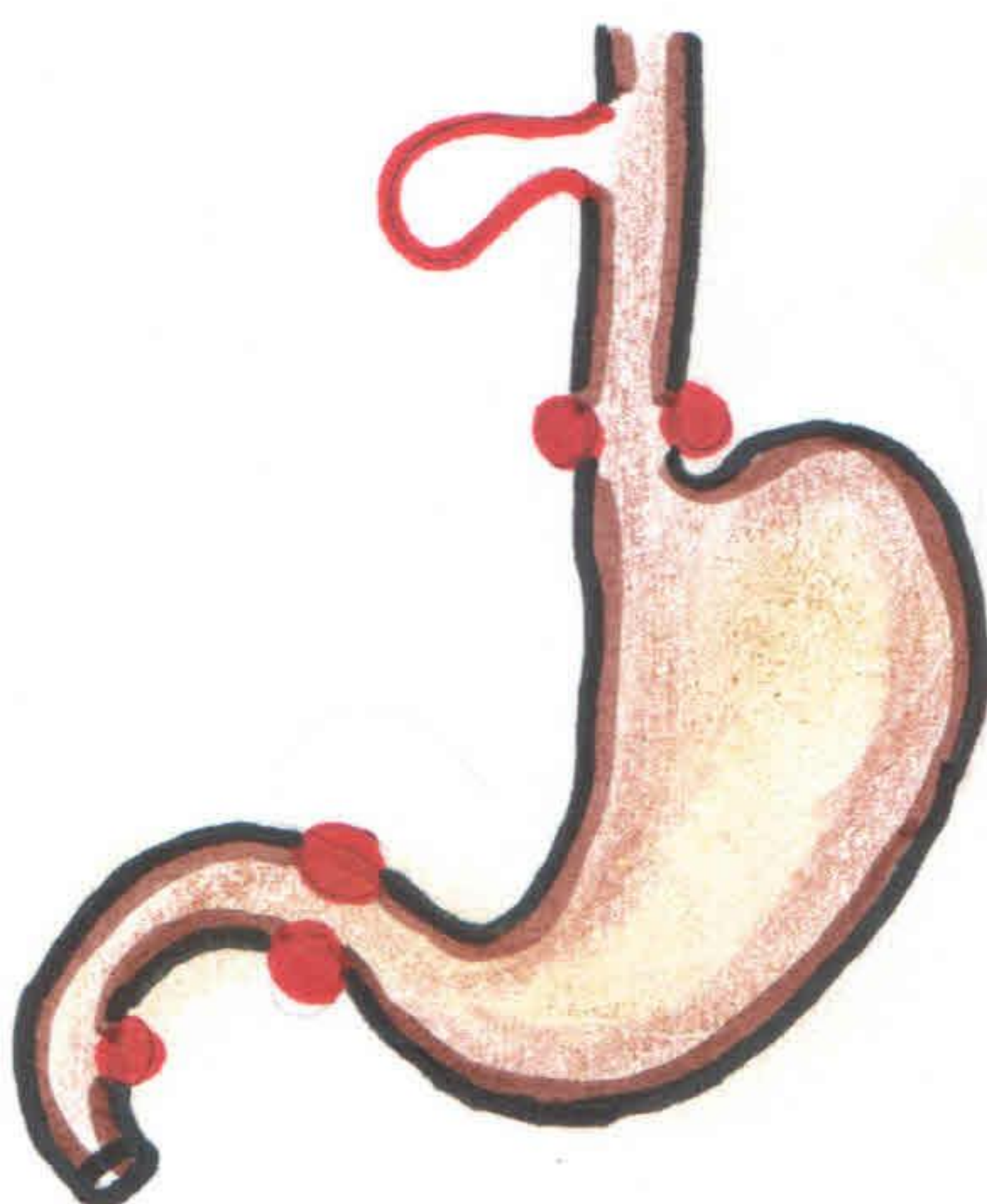
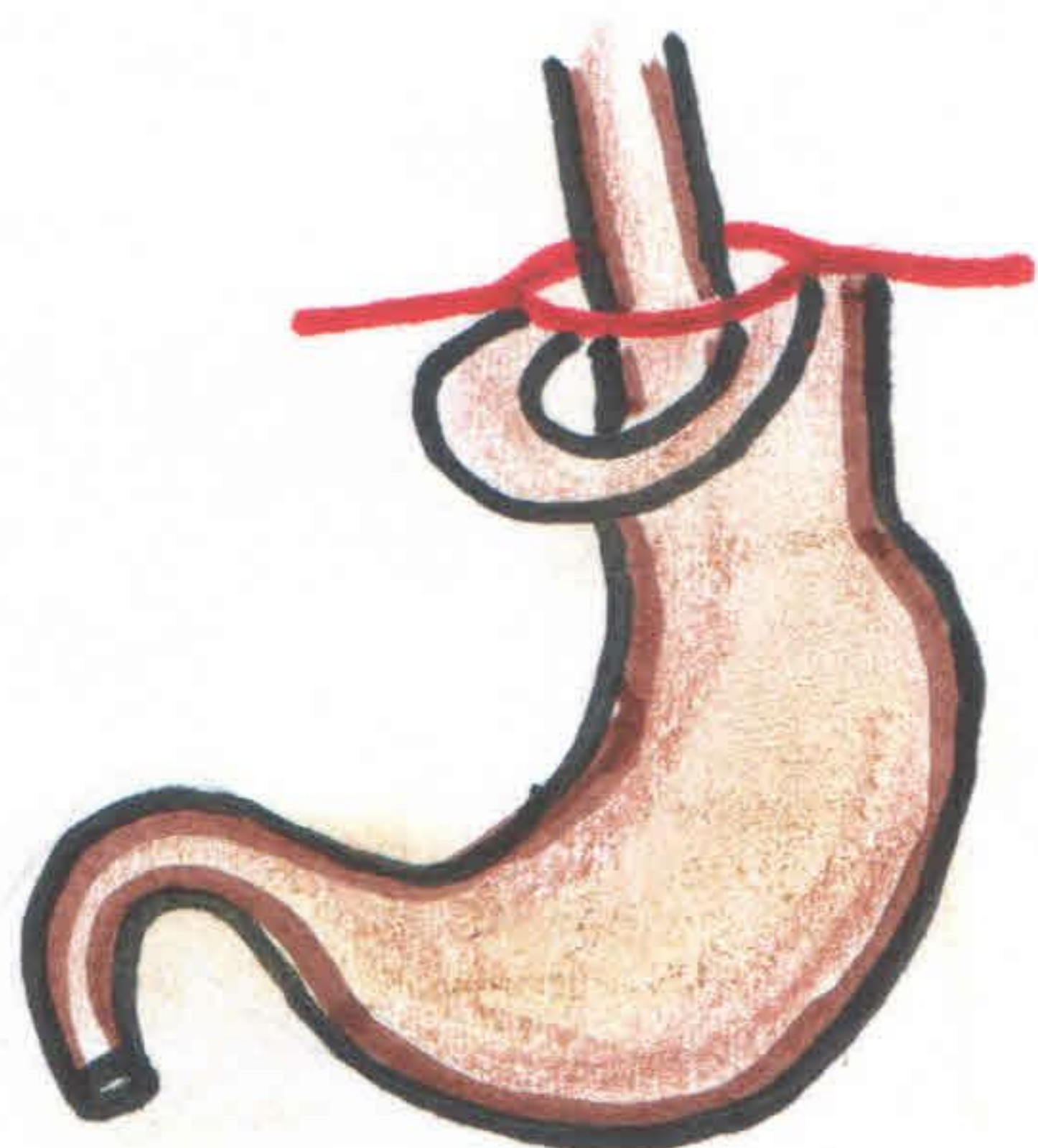
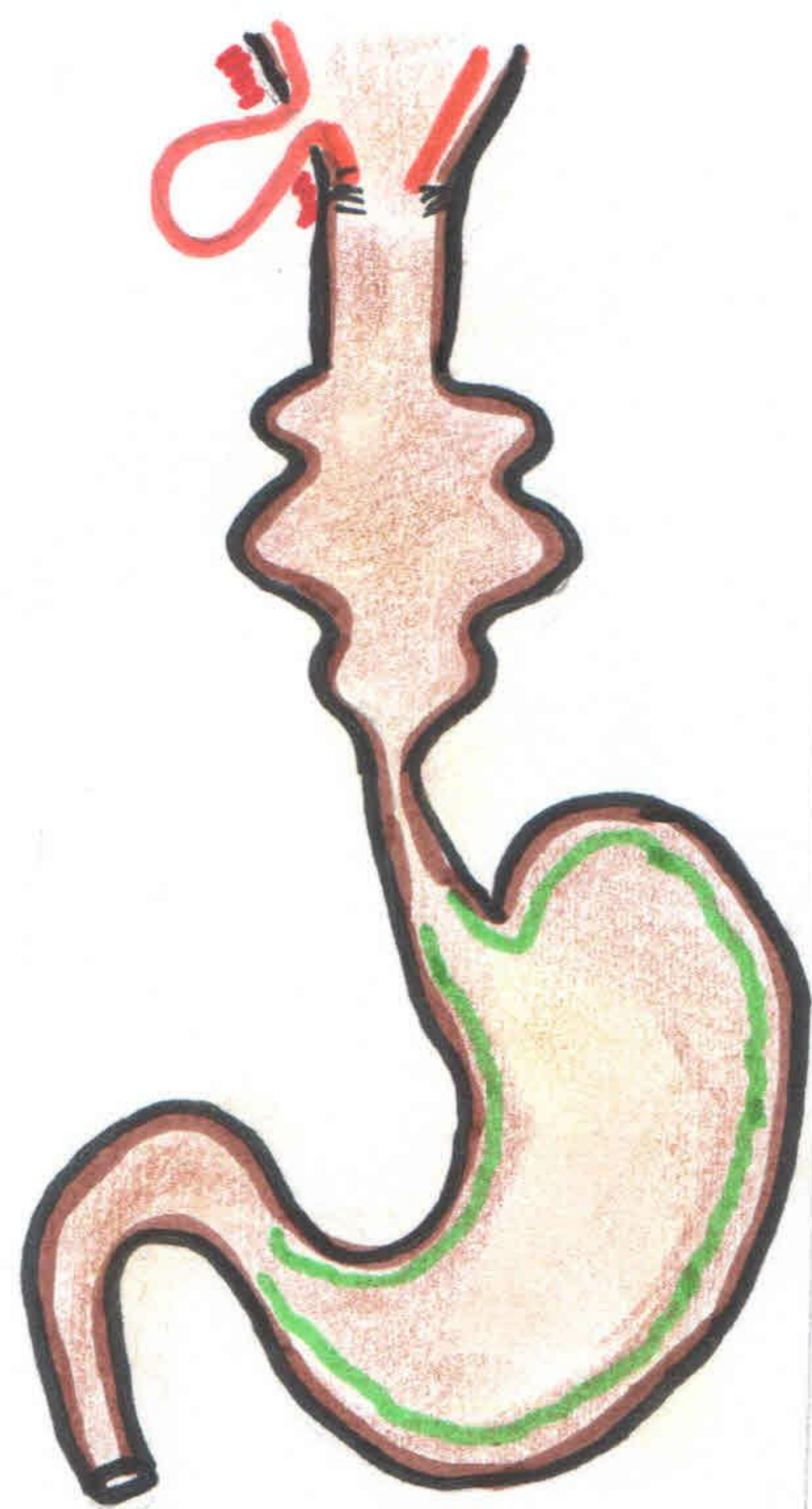
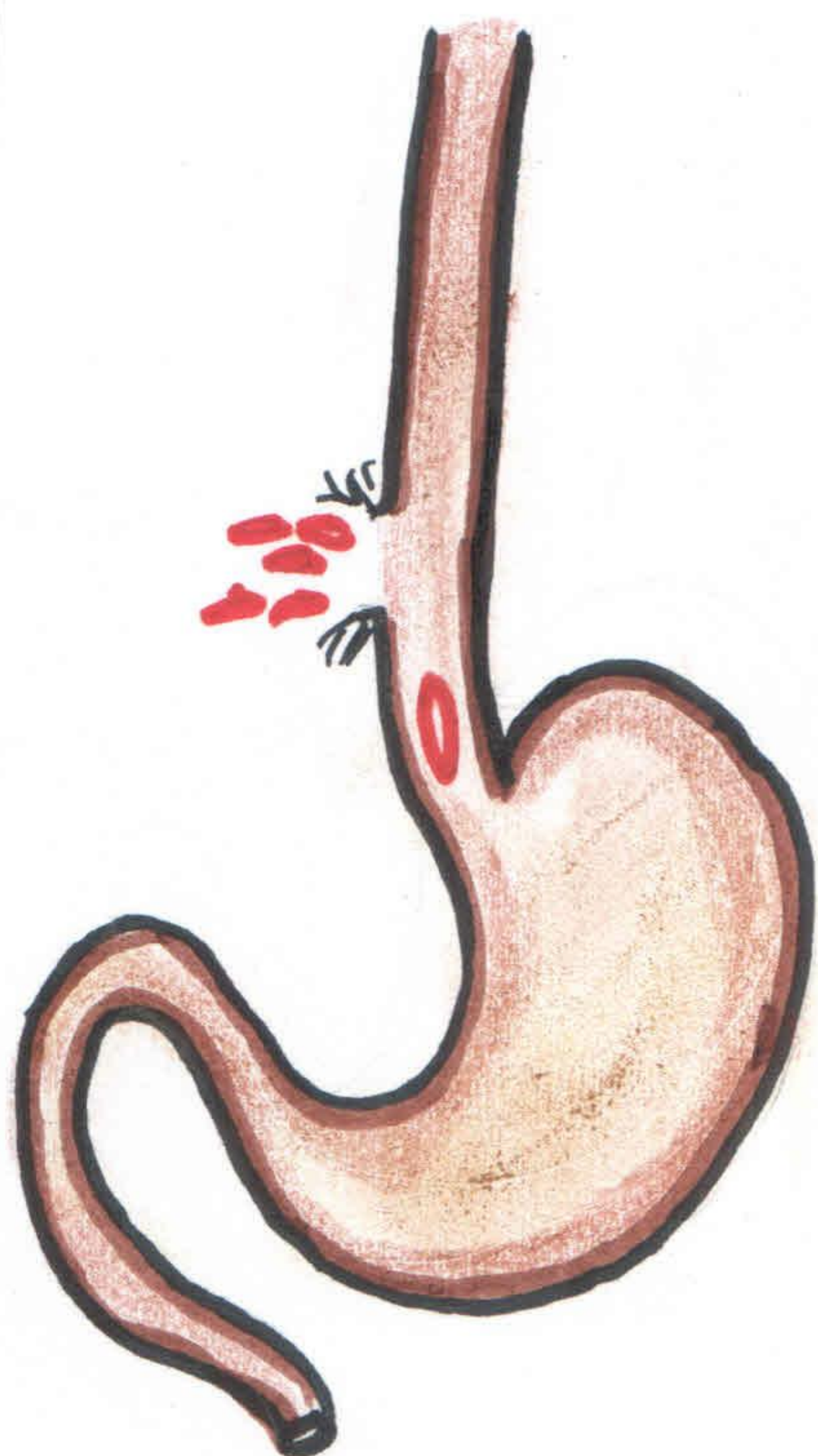
OTHER DISORDERS

- esophageal varices (see [Gastroenterology, G26](#))
- Mallory-Weiss tear (see [Gastroenterology, G27](#))



4Ss of SCC

Smoking
Spirits (alcohol)
Seeds (betel nut)
Scalding (hot liquid)



incidence:- old, male / china . uk

aetiology:- premalignant
radiation / smoking

pathology

- Micro (type, character)
- Macro (site, shape)
- spread
 - Local → regional LN
 - Lymph → LL BB
 - blood → Krukenberg
- staging / grading

C/P

- General wt loss / AAA
- Local dysphagia / dyspepsia /
- S/S metas LL BB

invest

- Gene.
- local
- look

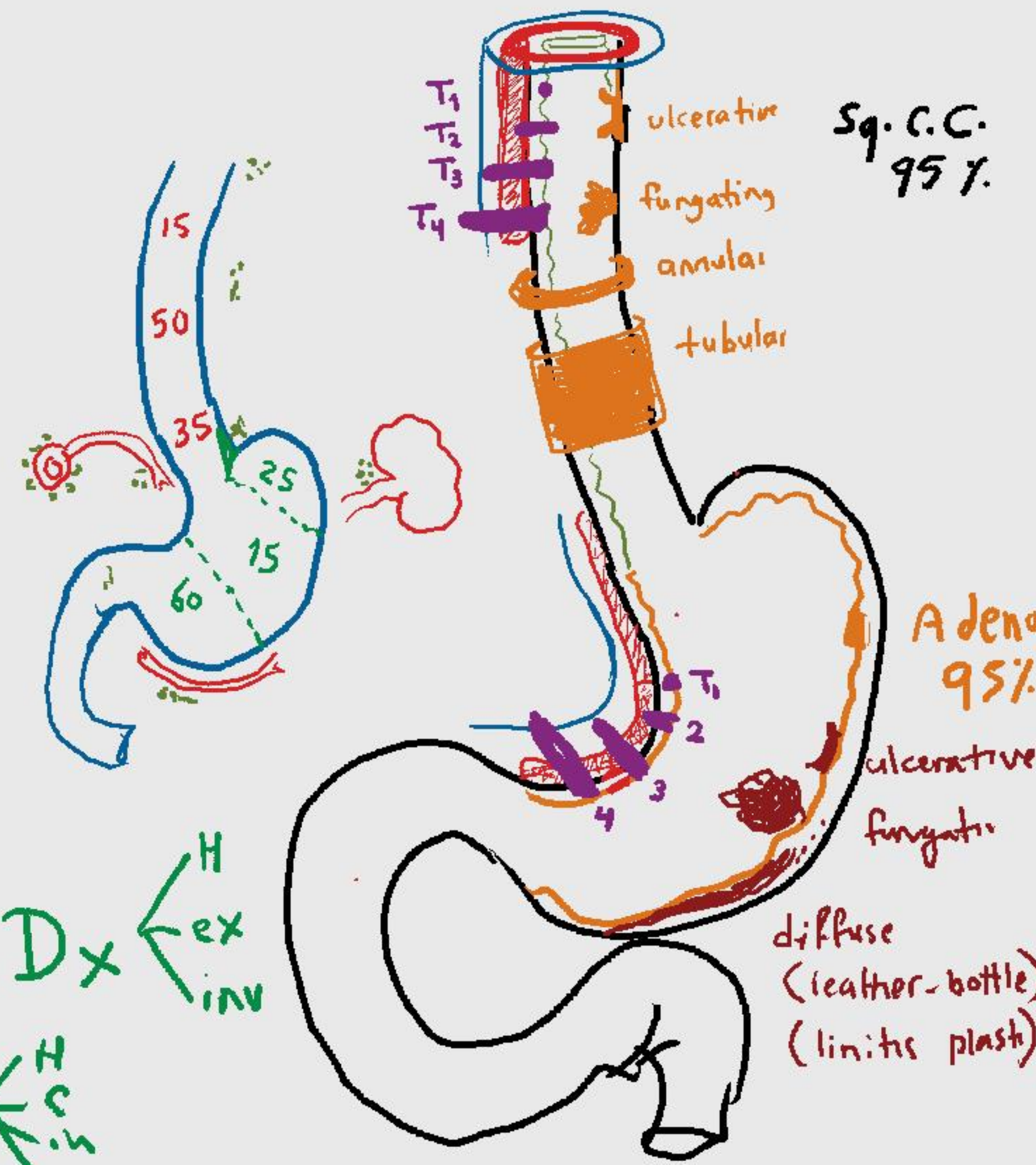
CEA

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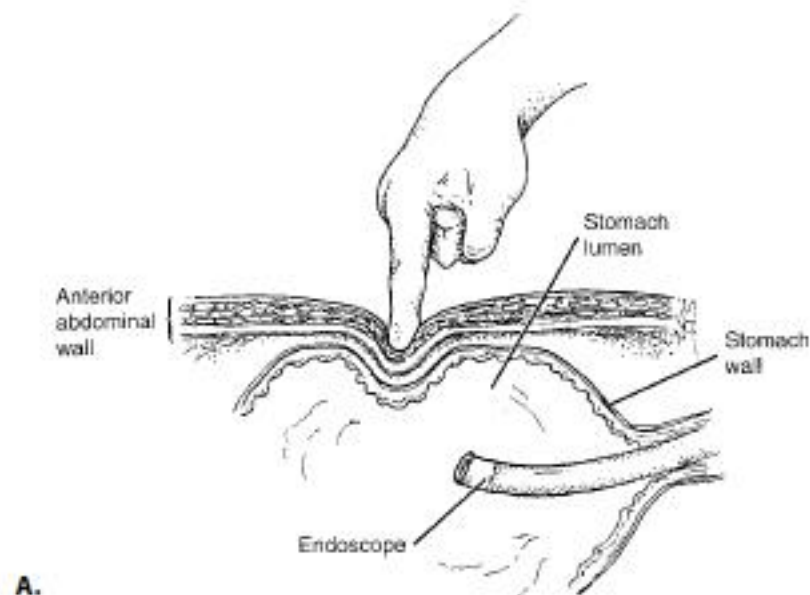
Mx

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- inv

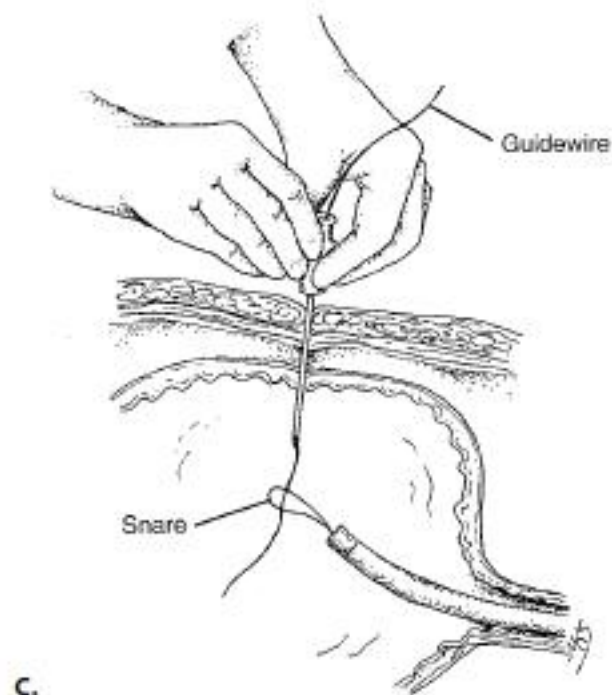


Part of the [enteric nervous system](#), Auerbach's [plexus](#) (or **myenteric plexus**) exists between the longitudinal and circular layers of [muscularis externa](#) in the [gastrointestinal tract](#) and provides [motor innervation](#) to both layers and [secretomotor](#) innervation to the [mucosa](#), having both [parasympathetic](#) and [sympathetic](#) input, whereas [Meissner's plexus](#) has only parasympathetic fibers.

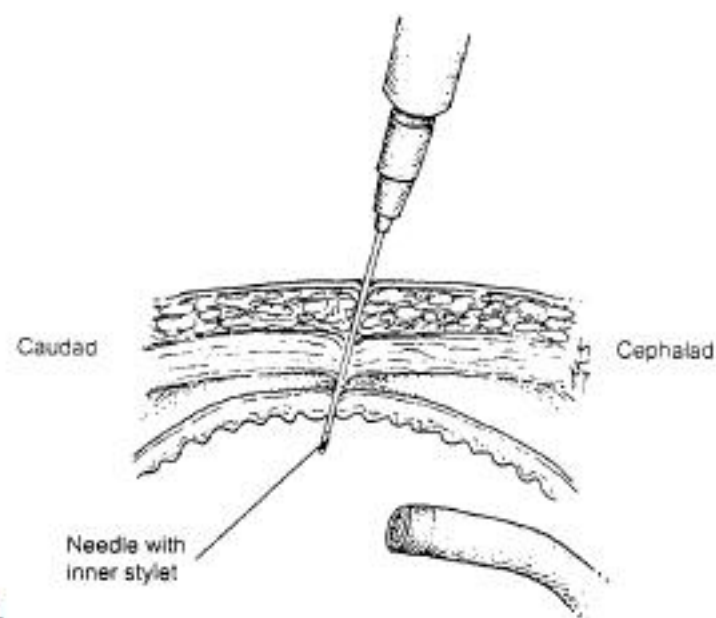
It arises from cells in the [Nucleus ala cinerea](#), the parasympathetic nucleus of origin for the tenth cranial nerve ([Vagus](#)), located in the [medulla oblongata](#). The fibers are carried by both the anterior and posterior vagal nerves. It is found in the muscles of the [esophagus](#), [stomach](#), and [intestine](#).^[1] The myenteric plexus is the major nerve supply to the [gastrointestinal tract](#) and control GI tract motility.^[2]



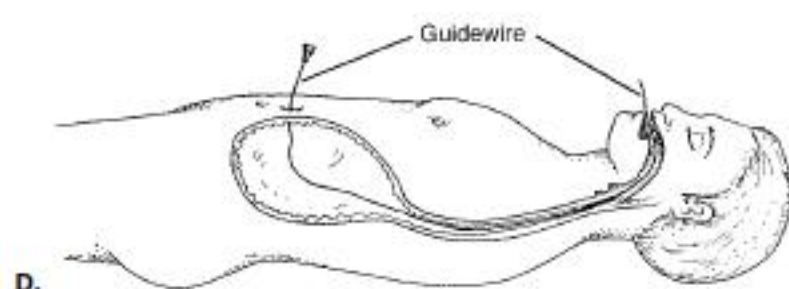
A.



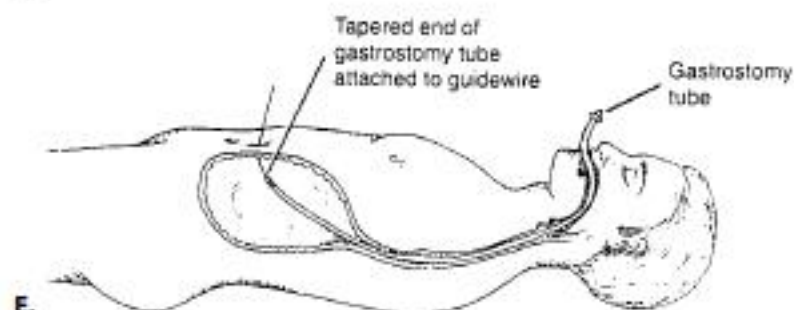
C.



B.



D.



E.

FIGURE 2.1. A. The procedure for percutaneous endoscopic gastrostomy includes transillumination of the stomach and identification of the needle insertion site. B. A needle is inserted into the stomach across the abdominal wall under direct vision. C. A guidewire passed through the lumen of the needle is grasped with a snare.

D. The ensnared guidewire is removed via the mouth. E. The tapered end of the gastrostomy tube is attached to the guidewire and pulled out through the stomach and abdominal wall to seal the button end. The external portion of the gastrostomy tube is then trimmed to fit the patient's body habitus as desired.



